

## 1. Difference Between Linux and Windows Operating Systems:

Basis	Linux	Windows
Developer	Developed by Linus Torvalds	Developed by Microsoft
Source Code	Open-source (source code is freely available)	Closed-source (source code is not public)
Cost	Mostly free	Paid (license required)
Security	Highly secure, fewer viruses	More prone to viruses and malware
User Interface	Command-line based with GUI support	Mainly graphical user interface (GUI)
Customization	Highly customizable	Limited customization
Stability	Very stable, rarely crashes	Less stable compared to Linux
Performance	Works well on low-end hardware	Requires higher system resources
Software Installation	Uses package managers (apt, yum, etc.)	Uses .exe or Microsoft Store
File System	Ext4, XFS, Btrfs	NTFS, FAT32
Gaming Support	Limited (improving)	Excellent gaming support
Usage Areas	Servers, supercomputers, developers	Personal computers, offices

## 2. What is Kernel:

Kernel is the core (heart) of an operating system. It acts as a bridge between the hardware and the user/application software. The kernel controls all major operations of the computer system. Kernel is the central component of an operating system that manages system resources such as CPU, memory, devices, and processes.

### **Types of Kernel:**

- **Monolithic Kernel**
- **Microkernel**
- **Hybrid Kernel**
- **Exokernel**

### **Functions of Kernel:**

- **Process Management**
- **Memory Management**
- **Device Management**
- **File System Management**
- **System Calls**
- **Security & Access Control**

## **3. Linux Distributions or Flavours:**

A Linux distribution (distro) is a complete operating system built using the Linux kernel, along with system tools, libraries, package managers, and desktop environments.

### **Popular Linux Distributions / Flavours:**

#### **1. Ubuntu**

- **User-friendly and beginner-friendly**
- **Based on Debian**
- **Used for desktops, servers, and cloud**
- **Package manager: APT**

#### **2. Debian**

- **Very stable and secure**
- **Preferred for servers**
- **Community-driven project**
- **Package manager: APT**

### **3. Fedora**

- **Sponsored by Red Hat**
- **Uses latest technologies**
- **Suitable for developers**
- **Package manager: DNF**

### **4. Red Hat Enterprise Linux (RHEL)**

- **Commercial Linux distribution**
- **Used in enterprises**
- **High security and support**
- **Package manager: YUM / DNF**

### **5. CentOS / AlmaLinux / Rocky Linux**

- **Free alternatives to RHEL**
- **Used for servers**
- **Enterprise-grade stability**

### **6. Linux Mint**

- **Easy transition for Windows users**
- **Based on Ubuntu/Debian**
- **Lightweight and stable**

### **7. Arch Linux**

- **Highly customizable**
- **Rolling release model**
- **Advanced users only**

- **Package manager: Pacman**

## **8. openSUSE**

- **Stable and enterprise-oriented**
- **Powerful system tools (YaST)**
- **Package manager: Zypper**

## **9. Kali Linux**

- **Used for cybersecurity and penetration testing**
- **Includes security tools**
- **Based on Debian**